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(71) Applicant (for AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW only): UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).	
(71) Applicant (for all designated States except AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW): UNILEVER N.V. [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).	
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(54) Title: ANTIPIERSPIRANT COMPOSITION

(57) Abstract

An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterized in that the propellant comprises pentane.

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ANTIPERSPIRANT COMPOSITION

The present invention relates to antiperspirant compositions. More particularly, the invention relates to 5 aerosol compositions having improved cosmetic characteristics.

Antiperspirant and deodorant compositions can be applied to the skin by a variety of methods. Generally, such 10 compositions comprise a carrier vehicle material in addition to an antiperspirant and/or deodorant active, the carrier and active being selected in accordance with factors such as the method of application, the intended use, the desired rheology and the desired cosmetic characteristics.

15 Aerosol compositions have gained wide consumer acceptance. Aerosol antiperspirant compositions generally comprise an anhydrous system comprising an antiperspirant salt dispersed in a liquid vehicle together with a liquefied volatile 20 propellant in a pressurised aerosol container.

25 Consumers can be generally divided into two classes - those who favour the use of antiperspirant aerosol compositions and those who favour deodorant aerosol compositions. The presence of the antiperspirant active in antiperspirant aerosol compositions imparts different cosmetic or sensory properties to the antiperspirant aerosol compositions which are absent from alcoholic deodorant formulations.

30 Generally, deodorant composition contain high levels (usually 30% or over) of short-chain monohydric alcohol, which has a deodorising effect and which imparts a cold or fresh feeling to the skin.

Conversely, antiperspirant compositions are usually incompatible with high levels of alcohol and/or water, due to the tendency to form corrosive solutions, and therefore generally tend to comprise a relatively high proportion of compounds such as volatile cyclic silicones in their cosmetic vehicles, which have a low heat of evaporation compared to ethanol and water. As such, antiperspirant compositions tend to produce less of a cooling sensation on application, and generally do not impart such a fresh feeling.

Many consumers, therefore, choose deodorants over antiperspirants in order to achieve a cold or fresh feeling on application. However, deodorants unlike antiperspirants fail to prevent sweat generation and also exhibit poor malodour reduction over time.

Accordingly, consumers who select an aerosol deodorant over an antiperspirant for initial freshness fail to enjoy the additional benefits of an antiperspirant.

US 4,152,416 describes aerosol antiperspirant compositions capable of dispensing an astringent solid with low mistiness and dustiness. A polymer gum is used in the aerosol composition to reduce the mistiness and/or dustiness of the aerosol composition.

US 4,806,338 also describes the use of amino functional silicones in antiperspirant aerosol compositions in order to improve the cosmetic properties of the composition. Moreover, US 4,806,338 implies that the use of such silicones helps to prevent undesirable cooling on the skin.

EP 343,843 of the Mennen Company also describes the use of a substantivity fluid made up of a silicone polymer dissolved in a carrier fluid to prevent clogging of aerosol valves at 5 low delivery rates.

Co-pending application GB 96124477.1, in the name of the applicants, describes an aerosol antiperspirant composition in which polymers are incorporated in the composition for 10 the purpose of retarding evaporation of propellant gases in the composition, and thereby causing a proportion of the propellant gas to be retained with the composition, and deposited on the skin. The evaporation of this propellant gas on the skin generates a cooling sensation, and thereby 15 provides the composition with this sensory benefit.

According to the invention there is provided an aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a 20 propellant, characterised in that the propellant comprises pentane.

Compositions according to the invention typically produce a cool feeling on application.

25 In highly preferred aspects of the invention, the propellant composition comprises from 1-50% part pentane gas, which can be n-pentane, isopentane or cyclopentane; preferably the propellant comprises 2-40%, more preferably 5-25% pentane. 30 Of the possible pentane species, n-pentane is preferred. Preferably the pentane level is less than 40%, since at levels above this the pentane in the dispensing container causes the vapour pressure to be depressed too much, and the

aerosol container may block due to insufficient vapour pressure in the container.

5 The compositions according to the invention may additionally comprise a polymer, and the propellant is conveyed and deposited on the skin by a propellant-polymer mix.

10 Preferably, the polymer comprises a silicone polymer. The silicone polymer can be a silicone gum or a silicone fluid. However, an advantage of compositions according to the invention is that sensory benefits can be obtained over compositions which contain only other ordinary propellants, such as isobutane, propane, butane, or mixtures thereof, also without the use of additional polymers to induce cooling.

15 In an alternative embodiment, the invention relates to the use of pentane as a skin cooling agent in the preparation of an aerosol composition, which may also comprise an antiperspirant active.

20 If the composition does comprise an additional polymer to enhance the cooling sensation on application, conveniently the polymer is a polydimethylsiloxane gum, preferably a dimethicone and/or dimethiconol gum.

25 Accordingly, the present invention provides an antiperspirant composition having the skin cooling benefits of an alcoholic deodorant composition, in a composition which is totally free, or substantially free (i.e. containing less than 1% by weight) of short chain monohydric alcohols such as ethanol or isopropanol, but is also substantially free (i.e. contains less than about 4%) of water.

Accordingly, a consumer can enjoy the sensory benefits of a traditional alcoholic aerosol deodorant composition, while 5 enjoying the deodorant and antiperspirant efficacy of a traditional aerosol antiperspirant composition.

The antiperspirant material of the invention is preferably a particulate antiperspirant, and can be any of the known antiperspirant active materials. Particularly preferred 10 materials are astringent metallic salts, in particular the inorganic and organic salts of aluminium, zirconium and zinc and mixtures thereof. Particularly preferred are the aluminium and zirconium salts such as aluminium halides, aluminium hydroxide halides, zirconium hydroxy halides, 15 zirconium oxide halides and mixtures thereof. Generally, such antiperspirant salts for example comprising aluminium and/or zirconium salts are any of those well known in the art. US patent no. 4,152,416 describes various aluminium zirconium salts which are suitable for use in the present 20 invention. Typically, the antiperspirant active is present at a level of from about 0.1% to about 20% by weight of the composition.

Generally, when they are used, the silicone gums suitable 25 for use in the present invention are as defined in US 4,152,416 and have a viscosity ranging from about 0.5 to 100  $\text{m}^2\text{sec}^{-1}$  (500,000 to 100,000,000 centistokes) at 25°C. Typical silicone gums are the polydimethylsiloxane polymers such as dimethiconol and dimethicone gums.

30 The silicone gum if used is preferably present at levels from about 0.01% to about 6% by weight, more preferably from about 0.02% to about 4% by weight of the composition.

Alternatively or in addition to the silicone gum, silicone fluids can also be used to generate an enhanced cooling effect in compositions according to the invention. Suitable 5 fluids are the DC200 series of silicones available from Dow Corning.

The aerosol antiperspirant compositions of the present invention also preferably contain additional solvent or 10 carrier material. Particularly preferred are volatile low viscosity silicones.

The term "volatile" also includes materials that are only slowly volatile and require a longer time to evaporate than 15 e.g. volatile silicones.

A particularly preferred series of volatile liquid carriers are the cyclomethicone liquids. Generally, the volatile low viscosity liquids usable in the present invention have a 20 boiling point of at least 100°C and a viscosity of less than  $1 \times 10^{-5} \text{ m}^2\text{sec}^{-1}$  (10 centistokes) at 25°C. The volatile silicone fluids are utilised at levels of about 1% to about 30%, preferably from about 2.5% to about 14.5% by weight of the composition.

25 Suitable silicone gums and volatile silicone fluids are available as standard proprietary material mixes or solutions e.g. Q2-1401 available from Dow Corning. SE30, a silicone gum available from the General Electric Company can 30 also be used.

The compositions of the invention also contain one or more volatile aerosol propellant materials which in a gaseous

state carry the other components of the invention in particulate or droplet form, in addition to pentane. Suitable propellants have a boiling point in the range of from -45°C to about 5°C and are present at levels from about 5 20% to 90% by weight of the composition.

For the further propellant, suitable other aerosol propellants are well known in the art and include the chemically inert hydrocarbons such as propane, n-butane, 10 isobutane, cyclopropane, dimethyl ether and mixtures thereof.

The antiperspirant compositions of the present invention may also comprise a suspending agent to suspend the 15 antiperspirant actives. Suitable suspending agents include colloidal silicas and hydrophobic clays such as the bentonites and hectorites. A particularly preferred bentonite is hydrophobic bentonite e.g. Bentone, which is commercially available and is a bentonite treated with 20 hydrophobic cationic materials. Typically the suspending agents are utilised at a level of from about 0.3% to 3% by weight of the composition.

In addition, masking agents to conceal antiperspirant 25 active residue suitable for use in the compositions according to the present invention can be included. Suitable masking agents may be selected from aliphatic hydrocarbons (e.g. C8-C30, preferably C10-C16, more preferable C12-C15 linear or branched hydrocarbons), 30 aliphatic esters, aromatic esters and mixtures thereof. The preferred residue masking agents for use in the compositions according to the present invention are C8-C30, preferably C10-C16, more preferably C12-C15 mono- and di-alkyl esters

of aromatic carboxylic acids inclusive of the benzoates and phthalates. Suitable masking agents include isopropyl myristate, isopropyl palmitate, polydecenes, Fluid AP, the Finsolv range of benzoate esters and mixtures thereof which 5 can be used at ranges from 0.5% to 25% by weight of the composition.

In addition to the above mentioned ingredients customary adjuncts of aerosol antiperspirant compositions can also be 10 included in the composition. Such adjuncts include perfumes, bactericides, fungicides, emollients and other skin treating materials.

The following are examples of compositions within the scope 15 of the present invention. In the examples, all percentages of the specified ingredients are weight percentages.

EXAMPLE 1

Material	Chemical	Level (%wt/wt)
Antiperspirant active	Activated aluminium chlorohydrate	5.0
Volatile silicone (DC 245)	Cyclomethicone	6.3
Masking agent (Fluid AP)	PPG-14 butyl ether	2.0
Fragrance		0.7
Suspending agent (Bentone 38)	Quaternium-18 hectorite	1.0
Propellant	n-pentane	10.0
Propellant	Butane/Isobutane/Propane	75.0

EXAMPLE 2

Component	% (w/w)
Antiperspirant active (Aluminium chlorohydrate)	10.0
Volatile silicone (Cyclomethicone)	3.1
Masking agent (Finsolv TN)	5.0
Suspending agent (Bentone 38)	1.0
Fragrance	0.7
Silicone gum (Q2-1401)	0.2
Propellant (n-pentane)	10.0
Propellant (Butane/Isobutane/Propane)	70.0

EXAMPLE 3

Component	% (w/w)
Antiperspirant active (Activated aluminium chlorohydrate)	4.0
Volatile silicone (Cyclomethicone)	3.8
Suspending agent (Bentone 38)	1.0
Fragrance	1.0
Silicone gum (Q2-1401)	0.2
Propellant (n-Pentane)	20.0
Propellant (Butane/Isobutane/Propane)	70.0

5

Experimental

Temperature measurements were conducted during the spraying of various aerosol compositions. In particular, an 10 instrument comprising three K-type thermocouples arranged in a vertical line was used to measure the temperatures of various sprays. The temperature profile of different compositions of sprays was measured when sprayed at the thermocouple array for a period of 2 seconds, from a 15 distance of 10 cm.

The compositions of Examples 2 and 3 above were sprayed, as were a nominal alcoholic deodorant composition (comprising

50% propane propellant, 0.5% perfume and 49.5% ethanol), and a formulation generally similar to Example 3 above (i.e. containing 20% pentane), but not containing any Q2-1401 silicone gum.

5

It was generally found that the compositions containing n-pentane had superior cooling properties to those of the alcoholic deodorant in terms of producing a larger initial temperature drop, i.e. larger degree of cooling.

10

In addition, both the alcoholic deodorant composition and a composition similar to Example 2 containing 10% pentane and silicone gum were tested on a trained panel to assess the sensory properties for each product. For the two 15 formulations, it was found that both formulations achieved similar ratings for the cold feeling on application, degree of stinging, stickiness and freshness feeling. The composition containing pentane scored higher than the alcohol formulation in terms of the dry feeling it produced.

20

These results demonstrate that in most assessment criteria, in particular those related to "freshness" on application, compositions according to the invention exhibited similar levels of freshness to a conventional alcoholic deodorant, 25 which in turn would be a higher level of freshness than a conventional antiperspirant aerosol composition. In at least one criterion, the antiperspirant aerosol according to the invention actually surpasses the performance of the alcoholic deodorant composition.

30

Accordingly, the compositions of the invention have the desirable sensory attributes of a an alcoholic deodorant (i.e. cooling and freshness). In addition, a composition

such as Example 1 benefits over an alcoholic deodorant by conferring antiperspirancy (greater than 30% sweat reduction) and significantly greater protection from malodour.

14.

CLAIMS

1. An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterised in that the propellant comprises pentane.  
5
2. An aerosol antiperspirant composition according to claim 1, wherein the pentane is present at a level of 1-50% by weight of the propellant in the composition.  
10
3. An aerosol antiperspirant composition according to claim 2, wherein the pentane is present at a level of 2-40% by weight of the propellant in the composition.  
15
4. An aerosol antiperspirant composition according to claim 3, wherein the pentane is present at a level of 5-25% by weight of the propellant in the composition.
- 20 5. Use of pentane as a skin cooling agent in the preparation of an aerosol composition.
6. Use according to claim 5 wherein the aerosol composition comprises an antiperspirant active.

# INTERNATIONAL SEARCH REPORT

Application No	PCT/EP 98/00812
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**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 A61K7/32 A61K7/00

According to International Patent Classification(IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI  Week 9426  Derwent Publications Ltd., London, GB;  AN 94-290808  XP002069146  "Antibacterial deodorising and cooling  spray agent for feet e.g. easing tiredness  - comprises cooling agent contg. pentane  liq. petroleum gas, ethanol, deodorising  agent, menthol and titanium oxide  microcapsules "  see abstract  &amp; JP 06 219 902 A (PIAS KK) 9 August 1994  -----  -/-</p>	1-6

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Sierra Gonzalez, M

## INTERNATIONAL SEARCH REPORT

National Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEMICAL ABSTRACTS, vol. 115, no. 22, 2 December 1991 Columbus, Ohio, US; abstract no. 239361, "Aerosol antiperspirants containing metal salts powders and isopentane and/or pentane" XP002069143 see abstract & JP 31 183 113 A (NONOGAWA SHOJI Y.K.) 20 May 1991 ---	1-4
X	CHEMICAL ABSTRACTS, vol. 104, no. 10, 10 March 1986 Columbus, Ohio, US; abstract no. 75105, "Antiperspirant and insect repellent aerosols" XP002069144 see abstract & JP 60 215 092 A (KAO CORP.) 28 October 1985 ---	1-4
X	CHEMICAL ABSTRACTS, vol. 115, no. 12, 23 September 1991 Columbus, Ohio, US; abstract no. 119859, XP002069145 see abstract & JP 03 095 289 A (SHISEIDO CO. LTD.) 19 April 1991 ---	1-4
X	US 4 695 451 A (A. STRAW) 22 September 1987 see column 4, line 61-65 see examples 4-9 see claim 1 ---	1-4
X	WO 94 22420 A (QUEST INTERNATIONAL B.V.) 13 October 1994 see page 3, line 32-33 see claims 1,5,6 -----	1-4

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

Application No  
PCT/EP 98/00812

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 4695451	A 22-09-1987	DK	579282 A, B,	01-07-1983
		GB	2113706 A, B	10-08-1983
		SE	460259 B	25-09-1989
		SE	8207398 A	01-07-1983
WO 9422420	A 13-10-1994	EP	0691840 A	17-01-1996
		FI	954710 A	04-10-1995
		JP	8508265 T	03-09-1996
		US	5650146 A	22-07-1997

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<b>(30) Priority Data:</b> 9703261.9 17 February 1997 (17.02.97) GB			<b>Published</b> <i>With international search report.</i> <i>With amended claims.</i>
<b>(71) Applicant (for AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW only):</b> UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).			<b>Date of publication of the amended claims:</b> 22 October 1998 (22.10.98)
<b>(71) Applicant (for all designated States except AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW):</b> UNILEVER N.V. [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).			
<b>(72) Inventor:</b> TEMPLE, John; Unilever Research Port Sunlight Lab., Quarry Road East, Bebington, Merseyside L63 3JW (GB).			
<b>(74) Agent:</b> ROTS, Maria, Johanna, Francisca; Unilever plc, Patent Dept., Colworth House, Sharnbrook, Bedford MK44 1LQ (GB).			

**(54) Title:** ANTIPERSPIRANT COMPOSITION

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## AMENDED CLAIMS

[received by the International Bureau on 25 August 1998 (25.08.98);  
original claims 1-4 amended; remaining claims unchanged (1 page)]

1. An aerosol antiperspirant composition for topical application to the human skin, comprising an antiperspirant active and a propellant, characterised in that the propellant comprises pentane.  
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10
3. An aerosol antiperspirant composition according to claim 2, wherein the pentane is present at a level of 2-40% by weight of the propellant in the composition.  
15
4. An aerosol antiperspirant composition according to claim 3, wherein the pentane is present at a level of 5-25% by weight of the propellant in the composition.
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6. Use according to claim 5 wherein the aerosol composition comprises an antiperspirant active.

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